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## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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<b>(21) International Application Number:</b> PCT/NO98/00045 <b>(22) International Filing Date:</b> 9 February 1998 (09.02.98) <b>(30) Priority Data:</b> 970657 13 February 1997 (13.02.97) NO <b>(71) Applicant (for all designated States except US):</b> HITEC ASA [NO/NO]; P.O. Box 178, N-4033 Forus (NO). <b>(72) Inventor; and</b> <b>(75) Inventor/Applicant (for US only):</b> GJEDEBO, Jon [NO/NO]; Bergelandsgt. 51, N-4012 Stavanger (NO). <b>(74) Agents:</b> HÅMSØ, Borge et al.; Håmsø Patentbyrå Ans, P.O. Box 171, N-4301 Sandnes (NO).		<b>(81) Designated States:</b> AL, AM, AT, AT (Utility model), AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, CZ (Utility model), DE, DE (Utility model), DK, DK (Utility model), EE, EE (Utility model), ES, FI, FI (Utility model), GB, GE, GH, GM, GW, HU, ID, IL, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SK (Utility model), SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG).  <b>Published</b> <i>With international search report.</i> <i>In English translation (filed in Norwegian).</i>
<b>(54) Title:</b> SUPPORT OF A NUMBER OF PARALLEL PIPELINES/HOSES/CABLES ETC. BETWEEN A SURFACE VESSEL AND A POINT ON THE SEABED		
<b>(57) Abstract</b> <p>A support of a number of pipelines/hoses/cables (26a-26c) etc. extending essentially in parallel between a surface vessel, for example in the form of a production ship (10), and the seabed (20) in the area of a subsea well, is formed so that the use of a swivel device is made redundant. For this purpose the pipelines etc. (26a-26c) are collected into a bundle (28), whose one end is fixedly attached in the surface vessel (10), and whose other end is fixedly attached at the seabed (20). The pipe bundle (28) extends centrally through a vertical through recess (12) of the surface vessel (10), and absorbs the rotational movements of the surface vessel (10) through torsion.</p> <div data-bbox="1055 1165 1445 1963" data-label="Image"> </div>		

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SUPPORT OF A NUMBER OF PARALLEL PIPELINES/HOSES/CABLES  
ETC. BETWEEN A SURFACE VESSEL AND A POINT ON THE SEABED

The invention relates to a particular support of a number of parallel pipelines/hoses/cables etc. extending  
5 between a surface vessel, e.g. a production ship, and a point on the seabed. The point on the seabed will normally be located by or immediately proximate to a wellhead pertaining to an oil or gas well.

The pipelines/hoses in question are high pressure lines  
10 and hoses. In addition there are electric cables. In such a pipe bundle are comprised hydraulic and electric direction/control lines, cables for electric signals etc. Lines of this kind are used during oil production, gas production, water injection etc.

15 The surface vessel, the production ship, may lie moored above the wellhead or close to the imaginary upward vertical projection of the wellhead, or it may be kept in a relatively stable position by means of so-called dynamic positioning. Such a surface vessel will be configured with a vertical through recess for lowering  
20 said pipe bundle or for receiving tubing for oil/gas

carried, at a relatively low pressure, from the well-head up to the production ship.

Such low pressure tubing may suitably be distributed around the circumference of the high pressure pipelines etc. first mentioned, so that a suitably compact collection of pipelines/hoses/cables is achieved, in which the former parallel high pressure pipelines, hoses and cables for the transfer of hydraulics, electric effect and electronic signals are located centrally, while the low pressure tubings are located peripherally.

Aboard the surface vessel the low pressure pipelines have a swivel device arranged thereto, which represents a relatively complex and very expensive device.

The object of the present invention has been to avoid the use of a swivel device for said parallel high pressure pipelines etc., especially since swivel devices for high pressure pipe lines are very expensive and complex.

This has been achieved, according to the invention, by the parallel high pressure pipelines etc. being collected into a pipe bundle, a so-called umbilical, which is secured at the seabed and to the surface vessel, so that it follows and absorbs the movement of the vessel by torsional effect. When the ship pivots on the vertical axis of said through recess, the pipe bundle is twisted. Such a pipe bundle, secured at both ends, could absorb torsional stresses due to for example a 720° rotational movement of the production ship.

A non-limiting example of an embodiment of the invention is illustrated in the attached drawings, in which:

Fig. 1 shows a small-scale situation side view of a pipe bundle supported in accordance with the invention, the production ship being shown in partial view;

Fig. 2 shows, on a larger scale, the upper portion of the centrally located pipe bundle and its support, the peripherally arranged low pressure tubings, and the surrounding structure of the ship in the area of its vertically through recess, shown in side-view/vertical sectional view;

Fig. 3 shows, on an even larger scale, a perspective view of the central pipe bundle, cut, in the area of the known swivel device of the low pressure tubings.

A surface vessel in the form of a production ship 10, which is only shown in part in Fig. 1, has, in a known manner, a recess 12 extending vertically therethrough, which in the shown example of an embodiment accommodates a pivotal cylindrical device 14 with vertical axis of rotation and a vertical through cylindrical bore 16, through which a number of pipelines, hoses, cables etc. pass. In the present case the low pressure pipelines 18a - 18d are comprised by tubings which carry oil/gas from the seabed 20. These low pressure tubings 18a - 18d are supported via a swivel device 22, in a conventional manner, on the upper surface of the pivotal cylindrical device 14, known in itself, which has an axis of rotation A.

High pressure pipelines, cables, hoses etc. are bundled, according to the invention, to form a pipe bundle generally defined by the reference numeral 28. The pipe bundle 28 may consist of any suitable bundling, a multi-channel pipeline, also of the kind configured to

receive and accommodate individual pipelines, cables etc., indicated by 26a - 26c at the top of Fig. 2, an umbilical structure or in another manner which serves the purpose, the main thing being to achieve formation  
5 of a highly elongated pipe bundle 28, which is able to resist and absorb torsional stresses produced by the turning about its longitudinal axis.

The pipe bundle 28 is placed centrally in relation to the peripherally positioned low pressure tubings 18a -  
10 18d.

In accordance with the invention the pipe bundle 28 is fixedly supported by its upper and lower end to respectively the surface vessel 10 via a portal-shaped structural part 30 and at the seabed 20 by 28'. The latter  
15 fixation will normally be in connection with a well-head, for example via the blow-out preventer (not shown) thereof.

The production ship 10 may be moored above the fixed securing point 28' of the pipe bundle 28 with a certain  
20 positional deviation in relation thereto, or the ship 10 may be kept in a relatively stable position by means of dynamic positioning.

When the ship 10 performs rotational movements at the surface, the pipe bundle 28 will absorb, because of its  
25 support in the form of firm attachment at both ends, the movements of the ship through torsion. The ship may for example turn round twice in the same direction, whereby the pipe bundle 28 is twisted correspondingly about its longitudinal axis. The pipe bundle 28 will  
30 have such a great length in the well services to be

performed, that it easily resists the resulting torsional stresses.



## C L A I M

An arrangement of support for a number of first pipelines/hoses/cables (26a-26c) etc., in which may be included high pressure lines, high pressure hoses, electric cables etc. for, among other things, transferring hydraulics, electric effect, electronic signals etc. to be used in connection with production of oil/gas from one or more wellheads on the seabed, water injection etc., in which one or more second pipelines in the form of low pressure production risers (18a-18d) from said wellhead(s) extend upward to a surface vessel in the form of a production ship (10), in which said risers (18a-18d) have a swivel device (22) arranged thereto, with a vertical axis of rotation, and in which individual pipelines/hoses/cables of said first pipelines/hoses/cables (26a-26c) etc. may be arranged with essentially parallel courses between the surface vessel/production vessel (10) and the seabed (20), characterized in that said first pipelines/hoses/cables etc. (26a-26c) in the form of high pressure lines/hoses, electric cables etc. are collected into a pipe bundle, multi-channel pipeline, umbilical or similar (28), whose one end is fixedly attached in the surface vessel (10), and whose other end is fixedly attached at the seabed (20), which pipe bundle or similar (28) because of its support and its bulky, complex cross-section is suitable for absorbing torsional stresses caused by normal pivotal movements that the surface vessel (10) performs in the horizontal plane about the axis of the pipe bundle or similar (28), for example torsional stresses corresponding to an up to 720° angle of rotation of the surface vessel (10) from an not stressed initial position.

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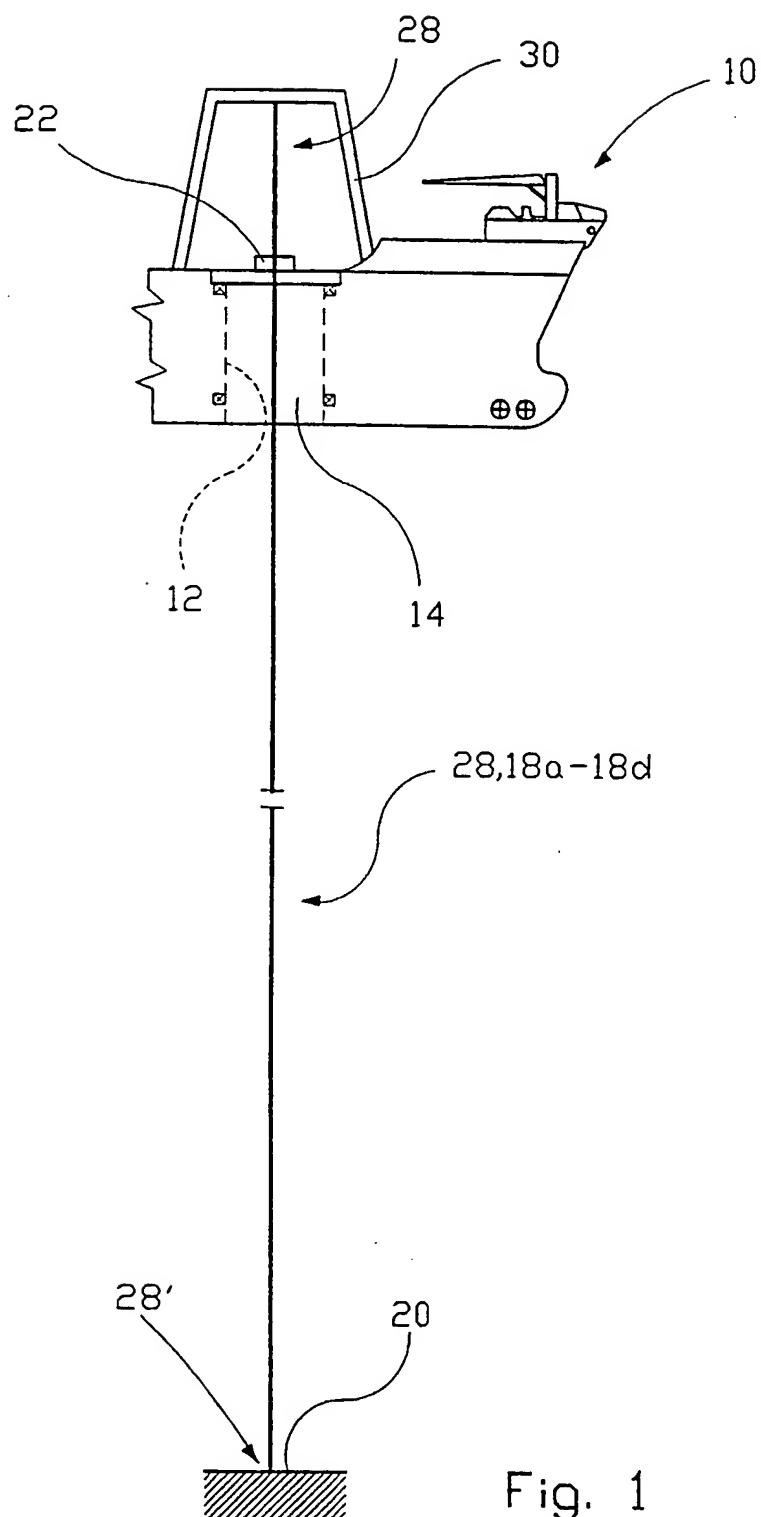
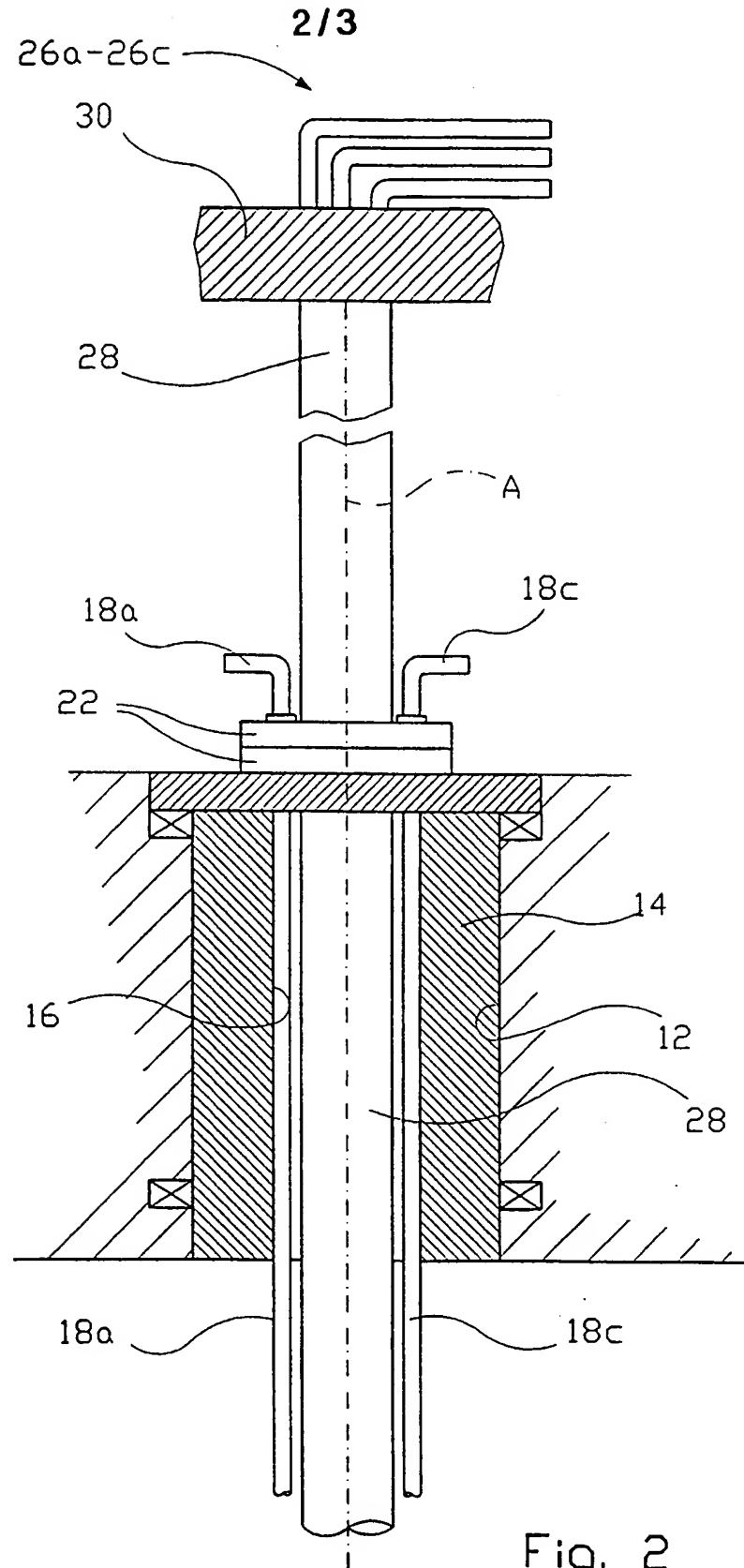


Fig. 1



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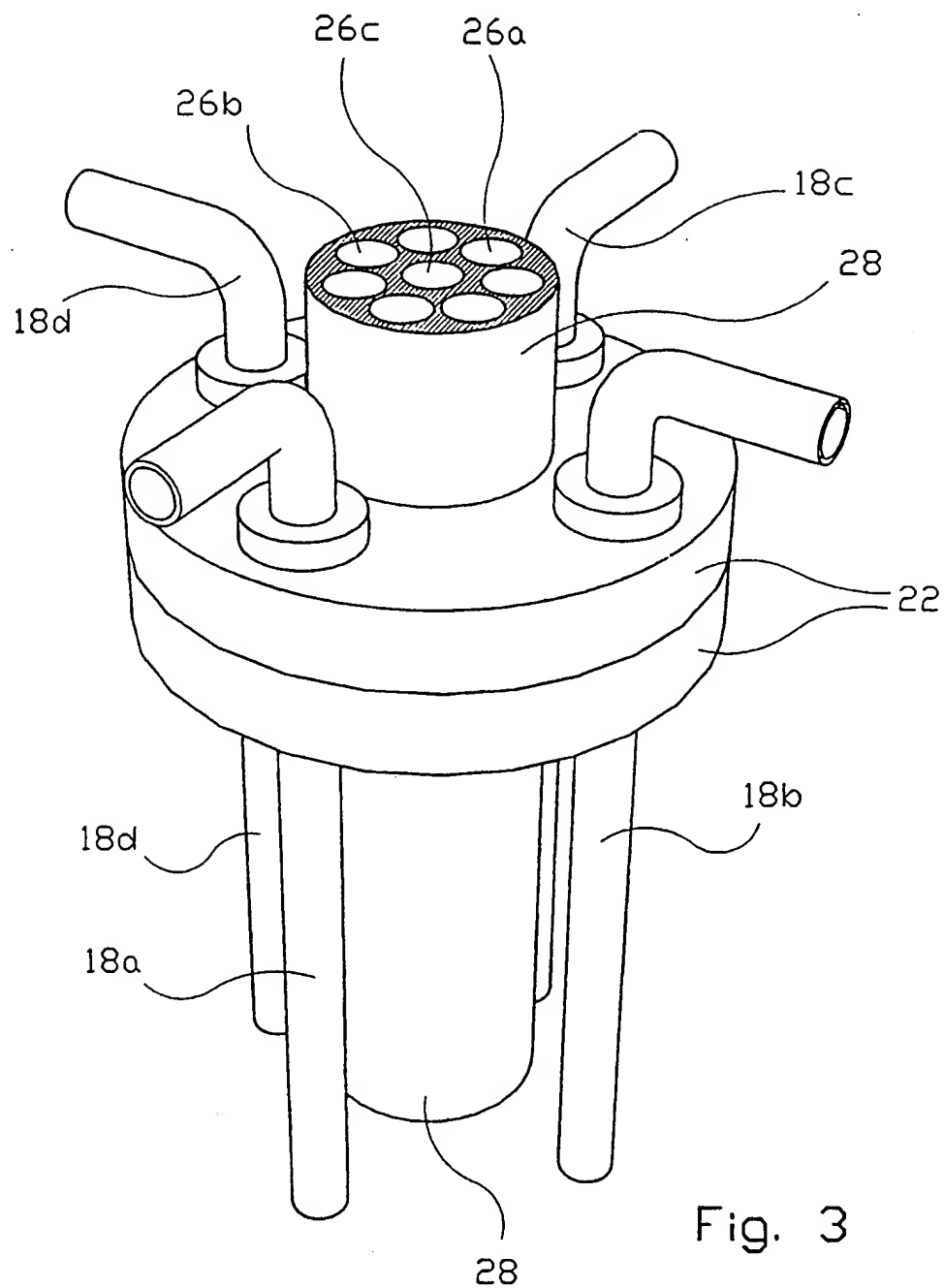


Fig. 3

## INTERNATIONAL SEARCH REPORT

International application No.

PCT/NO 98/00045

<b>A. CLASSIFICATION OF SUBJECT MATTER</b>		
<b>IPC6: E21B 43/01, E21B 17/01</b> According to International Patent Classification (IPC) or to both national classification and IPC		
<b>B. FIELDS SEARCHED</b>		
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<b>IPC6: E21B, B63B</b>		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched		
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<b>C. DOCUMENTS CONSIDERED TO BE RELEVANT</b>		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0387076 A2 (BRITOL PLC), 12 Sept 1990 (12.09.90), column 2, line 42 - line 47, figures 2, 8-9, abstract --	1
X	GB 2206144 A (THE BRITISH PETROLIUM COMPANY P.L.C.), 29 December 1988 (29.12.88), page 2 - page 3, figures, abstract --	1
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Date of the actual completion of the international search		Date of mailing of the international search report
11 May 1998		28 -05- 1998
Name and mailing address of the ISA: Swedish Patent Office Box 5055, S-102 42 STOCKHOLM Facsimile No. +46 8 666 02 86		Authorized officer  Christer Bäcknert Telephone No. +46 8 782 25 00

## INTERNATIONAL SEARCH REPORT

Information on patent family members

29/04/98

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 0387076 A2	12/09/90	CA 2011835 A DE 69027237 D US 5007482 A	09/09/90 00/00/00 16/04/91
GB 2206144 A	29/12/88	NONE	
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